

BOLIVIA'S NEW RAILWAYS

Three Great Lines Now Connect The High Plateau of The Andes With The Pacific

Across the Mountains to La Paz—Arica and Its Cog System. A Look at the Highest Railroad Points of the World—A New Railroad Built by Americans, but Now Owned by the English—Potosi and Its Silver Mines. To Buenos Aires via Bolivia—The New Lines Projected Into the Amazon Valley.

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LA PAZ.

The iron horse of transportation and commerce has climbed over the Andes and is now forcing his way through the wilds of Bolivia. Fifteen years ago all the railways of this country did not cover 300 miles. Today more than 2,000 miles are in operation, more than 500 miles are being constructed, and something like 3,500 have been surveyed or projected. When I last came to La Paz I rode over the Peruvian Southern railway from Mollendo to Arequipa, and thence on to Puno on Lake Titicaca.

I crossed that lake on a steamer to Chilitaya, Bolivia, and came with the mails on a stage across the plateau to La Paz. This year I have come by the same route as far as the lake, and thence to Guaqui, where an express train brought me in comfort right into the heart of the Bolivian capital.

In leaving La Paz to return to the seashore I was hauled by mules on a long three-days gallop down to Oruro, where I got the narrow gauge line that crosses the mountains and desert to the port of Antofagasta. I have gone over the same road this year, but it has now been extended from Oruro to La Paz and there are branch lines that will soon connect with the Argentine railway system and give a transcontinental line across southern Bolivia to the Atlantic ocean at Buenos Aires. Then Bolivia had no through railway to the sea. She has now three, the third being the short cut to the Pacific at Arica. The Arica road was completed only about a year ago, and the trains are just now beginning to run safely over it. During my stay in La Paz I have had talks with the managers of the several roads; and at Arequipa and Lima I gathered the latest information as to the Peruvian Southern, which, with its extension from Lake Titicaca to La Paz, forms one of the most important outlets to the trade of this country.

These Andean railways are the only ladders up which one can climb to the golden roof of the South American continent, and they are the only downspouts through which mineral and other products of the plateau can be sent to the seacoast. From here to the Isthmus of Panama there are now five such ladders. The first is in Ecuador. It runs from Guayaquil to Quito passing in full view or Chimborazo and Cotopaxi. The second is the Central Railroad of Peru. It climbs over the coastal range to the great copper mines of Cerro de Pasco, reaching an altitude which is far above that of any other railroad point of the world. The third is the Peruvian Southern. It climbs over a pass of more than 14,000 feet to Lake Titicaca; and the fourth and fifth are the Arica-La Paz and the Antofagasta-La Paz roads, which cross the Chilean desert and end at the Bolivian capital.

The highest of these roads is the Central Railway of Peru. I crossed it at an altitude which is more than three miles above the sea, and on one of its branch lines I ascended to a height of 15,805 feet, which is the highest place now reached by rail. The Peruvian Central crosses the Andes through the Galera tunnel, and then goes down into the fertile valley of Huancayo, and it will some day be extended to the navigable tributaries of the Amazon river.

The Southern Railway of Peru crosses the Andes at an altitude of 14,400 feet. Its highest point is about that of Pikes Peak, which is 14,147 feet above the sea. It then descends to Lake Titicaca, and from there drops down to La Paz, which lies in a hollow almost two miles and a quarter above the sea. The Central railroad goes up three miles in altitude over about 100 miles of track, and its total mileage, not including the Cerro de Pasco extension, is less than 250 miles.

The Southern road from Mollendo to La Paz including the trip across the lake, covers a distance of more than 500 miles. It is 223 miles from the sea, where it crosses the Andes, and there it is 1,000 feet lower than the altitude of the pass of the Peruvian Central.

The La Paz-Antofagasta line has a mileage of more than 700 miles, and its highest point on the main line is over 13,000 feet above the sea. The highest point on the Arica line is just under 14,000 feet, but the Antofagasta line is building branches that are al-

most as high as the highest point on the Morococha branch of the Central above Lima. One of these runs from Ollague to Colahuasi, where there are copper mines owned by the Guggenheims, said to be among the richest mines of the world. The other begins at Rio Mulato, between Oruro and Uyuni, and goes to Potosi, the famous mountain that has produced billions of dollars in silver and that promises to produce like values in tin. The Rio Mulato and Potosi branch crosses a pass 15,814 feet high, or only fifty-one feet lower than the pass to Morococha, where are great copper mines, largely owned by Americans.

Of all these lines the most difficult of construction was the Central Peruvian. It was begun in 1870 by Henry Meiggs, and its first 86 miles are said to have cost more than \$300,000 a mile. That road is of standard gauge, and it has not gradient steeper than 4 1/4 in 100. It has 67 bridges, one of which is 575 feet long, spanning a ravine 300 feet deep. Meiggs also built the greater part of the Southern railway, and that without cogs, and he was the constructor of the road from Valparaiso to Santiago that now forms a part of the first great route between the Pacific and the Atlantic.

Outside the Meiggs roads, the new line just opened from Arica to La Paz has been the most extensive and the most difficult of construction. The Arica-La Paz road is less than half as long as the Peruvian Southern, and only about one-third as long as that from Antofagasta to La Paz. Its length is under 250 miles. It begins at the seacoast and crosses the Andes at less than 14,000 feet above the level of the ocean. On some parts of the route the grades are so steep that the rack-and-pinion system has to be used. The maximum grade of the ordinary line is only about 3 per cent, while some of the cog sections reach a grade of 6 per cent. The cog section is longer than that of any other railroad, and there are many engineers who claim that it cannot be worked at a profit. The cog system is about the same as that of the roads up Pikes Peak, Mount Washington and the Rigi. It does well for tourist traffic, but whether it will work with the heavy freights is a question. One of the civil engineers engaged in its construction tells me he thinks that the cog part of the road may eventually be run by electricity.

During my stay in La Paz I have met Sir John Jackson, whose company has built the Arica-La Paz system. He is one of the famous engineers of the world and his company has work going on all over the globe. It is arranging to connect the Bolivian and the Argentine railway systems.

When the Panama canal is completed the shortest route from the United States to Bolivia will be by way of Arica. That port is 2,200 miles from Panama, and by the canal it will be less than 3,600 miles from New Orleans. Most tourists will prefer to go by way of Mollendo and the Peruvian Southern, the gradient of which is more gentle and which has also the advantage of the half-way station at Arequipa and the pleasant trip over Lake Titicaca. The quick jump from Arica to the top of the Andes is liable to give one sorroche, and many will not care to risk the long rack-and-pinion system. Some will go to La Paz by one route and come back by another. At present the most of the traffic to Bolivia passes either through Mollendo or Antofagasta.

The Antofagasta-Bolivia railway system is perhaps the most important of the republic. It is now giving a direct service from La Paz to the ocean in forty-four hours. There are three trains a week, with sleepers and diners. This road is about as long as from New York to Cleveland. Leaving Antofagasta, the chief seaport of northern Chile, the train takes you through the nitrate fields and across the Chilean desert, to the Bolivian frontier. You are all night and the whole of one day in making that journey, and you arrive at Oruro at about 9 o'clock the next morning. During the first 223 miles you reach an altitude of 13,000 feet. You then drop about 800 feet to the great bora lake, and thence climb over the mountains to the Bolivian plateau. A part of the way is over vast plains spotted with llamas and alpacas, and in plain sight of snow-clad peaks from 16,000 to 20,000 feet high. Oruro, the commercial center of the plateau, is the half-way station, and the distance from there to the Bolivian capital is 150 miles.

The Antofagasta road is one of the scenic routes of the world, and geologically and geographically it is one of the most interesting. The Bolivian plateau was once a great inland sea hundreds of miles long and sixty or more miles in width. Parts of it are as flat as a floor and the road goes for miles over beds of stone and stretches

of sea sand. I am told that sea shells are often found, and that fossils of fishes are in evidence. Some of the way is past volcanoes, and you see beds and mountains of lava of the most wonderful character. The road taps the treasure vaults of the Andes and its freight largely tin and copper ore, which is shipped from Antofagasta to the smelters of Europe and the United States.

The reconstruction of this Bolivian railway and its extension was financed and built by Americans. Only a few years ago Bolivia and Brazil entered into a treaty by which Bolivia conceded to Brazil a rubber region about twice as large as the state of Indiana for the sum of \$10,000,000. This money was used to build certain railroads for the development of Bolivia. Messrs. Speyer & Co., and the National City Bank of New York got the contract for the completion and extension of the Antofagasta road. Their scheme involved an expenditure of more than \$27,000,000, the capital to be made up of \$15,000,000 advanced by the Americans, and of \$12,500,000 by the Bolivian government. The American loan was secured by bonds and the guarantee of the government. One of the extensions to be made was the standard gauge from Oruro to La Paz, another was from Oruro to Cochabamba, and a third a line to Tupiza to connect with the Argentine system. The Potosi extension was also a part of the contract. This was in 1906, shortly after which time the work was begun. American engineers were brought in and by 1908 the line from Oruro to Viacha above La Paz was almost completed. Other constructions were well under way when the controlling interest in the undertaking was sold to the English Antofagasta and Bolivia Railway Company, and that at a big profit.

In this way the Antofagasta and Bolivian railroad passed out of the control of the Americans and into that of the English. The Americans may still own some of the stock, but the railroad belongs to and is managed by English capitalists. It has been completed to La Paz and is now advancing toward Cochabamba, a thriving town on the eastern side of the Andes. The same company is building a line from Uyuni to Tupiza, the total length of which will be about 120 miles. A short extension will connect that line with the Argentine railways, and then one can travel across country from Bolivia to Argentina. I understand that the Bolivian government has already contracted a loan for the building of the break from Tupiza to the Argentine frontier.

The Antofagasta road is one of the most profitable roads of all South America. It is the great down-the-mountain chute for the tin and copper ores of the Bolivian plateau, and as it has a monopoly, it can charge all that the traffic will bear. The freight rates are enormous, and that on coal from Antofagasta to La Paz is something like \$20 or \$25 a ton. Suppose you had to pay \$25 for getting a ton of coal from Washington to Detroit. I venture you would object, even as the La Paz people do.

By the extension of the lines the freight of the road will be greatly increased. Cochabamba is in a thriving agricultural district, with no outlet for its products. Potosi is on the slope of a mountain that was once a great mass of silver, and is now being worked for its tin. It is expected that many low-grade tin and silver mines which cannot be operated because of the high cost of transportation will be opened up as soon as the road is completed.

As to Tupiza, in southern Bolivia, that town is of no great importance, but all along the road from Uyuni there are rich tin mines and many low grade propositions will be opened up when the railroad goes through. As it is now, the chief trouble of this system is its two different gauges. Some of the tracks are of a forty-inch gauge, while others are of only thirty inches. The latter is the case with the road from Antofagasta to Oruro, but arrangements are being made to alter it to forty inches, thus standardizing the system.

A great deal of the Bolivian rolling stock comes from the United States. On the Antofagasta line the locomotives are chiefly Baldwins. A great many Rogers' are used on the Peruvian roads, and on the Arica line the engines are American, English and German. During the construction of that road there were fifteen locomotives and 140 flat cars in service. The heaviest engine weighed seventy tons. Our civil engineers have had much to do in laying out the road of Bolivia and Americans are now taking contracts for the new construction financed by the English. The rough work is largely done by Aymara Indians, who receive from 80 cents to a dollar a day. This is very high for Bolivia, where the average wages are perhaps not more than 20 cents per day.

Notwithstanding this, there is great trouble in getting good men. The Aymara usually works for a week or less, and then leaves. Sometimes he goes away without pay. I talked with one of the contractors last night as to the labor situation. Said he:

"The chief trouble is that all of the Indians are heavy drinkers of alcohol. After pay day we find that they have laid off many of them so that they may sober up. They all chew coca, and we allow them a certain amount of coca with their wages. They do not like foreigners, but we have to use foreigners as foremen, for the Indians are so low intellectually that they

cannot boss or plan. They have to be driven, and their sullen looks show that they are disgusted always with their job and are ready to leave at the first opportunity."

The most important part of Bolivia has not yet been touched by the railroads. I refer to the fertile eastern section, just over the Andes. This consists of enormous forests and high, grassy plains, which will feed millions of cattle. The government has planned railroads, which some day will be extended into this region. These roads go from the center of the plateau to the tributaries of the Amazon, and some will be extended to the navigable branches of the Paraguay as well. One road is planned from Potosi to Sucre, and another from Sucre to Lagunillas, the two together covering a distance of less than 225 miles. Another railway is to connect La Paz and Coripata Corico, and thence go on to the navigable waters of the Beni, down which ships can travel to the railroad about the falls of the Mamore-Madeira. When this railway is finished Bolivia will have an outlet to the Atlantic by way of the Amazon.

Another Amazon river branch is to be built from Cochabamba to the River Chimore, which flows into the Mamore, and there is also an extension from the Argentine system to connect with the same river at Puerto Rojas. It would seem that Santa Cruz is to be the railroad center for eastern Bolivia, and there will eventually be railroads throughout the whole region east of the Andes, opening up the country from Argentine to Ecuador and Colombia.

It will thus be seen that Bolivia is at the very beginning of its railroad development. This country is one-fifth as large as the main body of the United States with the addition of Alaska. About two-thirds of the land lies east of the mountains, and I doubt not the amount of good soil in the whole republic is proportionately as large as that of the United States. We have now about 200,000 miles of railway; and if Bolivia had as many in proportion to its size it would have something like 50,000 miles or almost forty times as much as the railways now in operation. It is not probable that such a system will be built for centuries to come, but the opening up of the 3,500 additional miles already planned or surveyed, will create an industrial revolution in that part of the country east of the Andes that will astonish the world.

FRANK G. CARPENTER.

GERMAN COUNT HAS BEEN LIVING NEAR COLUMBIA.

But Wilhelm Wedel Has Probably Now Rejoined Command.

Count Wilhelm Wedel of Oldenburg, Germany, a member of one of the oldest and most distinguished families of the Prussian empire, a nephew of Germany's representative at the Austrian court for so many years, since 1906 has been living in seclusion on a farm he owns near Columbia, working on valuable books dealing with his explorations in darkest Mongolia. He was for years secretary of the German legation at Peking, China, and frequently interpreted on state occasions for the dowager empress, who conferred elaborate decorations upon him. When the Boxer movement occurred he served with his command, the Oldenburg Light Dragoons, the flower of the German army, in which he is an officer, and was among the first over the walls of Peking. After the Boxer movement, on account of injuries, he was retired from the army on life pension.

About six weeks ago the count went over to Germany to visit his mother at her magnificent castle near Leipsic. His letters back to Columbia have been full of interesting notes. In his last letter, just before the trouble began, he stated that he expected to spend some weeks in the great libraries at London and would return to Columbia in the fall.

Un doubtedly, however, he has rejoined his command and is now an active participant in the war. His injury in China was only slight, and from it.

The count, so far as known, is the only white man who has ever penetrated the innermost recesses of Mongolia. He spent months at it, going on muleback, enduring all kinds of hardships, secured a wealth of information and hundreds of wonderful photographs, none of which have as yet been published. The work he has been engaged upon will doubtless be in great demand in all parts of the world if he survives the war, and completes it. He returned to Germany from China via St. Petersburg, Russia, without use of train, which fact will give some idea of his muleback travels.

The count is a brilliant young man of about 38 years of age and while of a retiring, modest disposition, has made many friends here, particularly among the country people—his neighbors.

In Bremen in 1906 he met Commissioner Watson of this State at a dinner given by mutual friends. A lasting friendship sprang up and when Mr. Watson returned to America Count Wedel came with him. Mr. Watson is to edit the English publication of his works for him.

Probably the easiest way to convince a man is to agree with him.